The Case for
API Standardization

**TM Forum's Open API program,
the importance of industry-wide
adoption, and future prospects for
Service Provider IT applications**

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Executive Summary

As digital transformation becomes a critical focus for companies across various industries, standardized Application Programming Interfaces (APIs) play a vital role in ensuring seamless and efficient Information Technology (IT) system integration. This white paper delves into the significance of API standardization, the contributions of TM Forum's Open API program towards this goal, the benefits reaped from actual implementations, and future prospects moving forward. In particular, we will examine how industry-wide adoption of standardized APIs can optimize service provision, reduce operational costs, and drive innovation in the IT applications space. Drawing on Amdocs' unique perspective as both a contributor to and consumer of TM Forum's Open API program, this paper aims to provide an insightful and compelling case for the importance of API standardization in shaping the future of Service Provider IT applications.

Specifically, we will explore:

- The indispensable role of API standardization for Service Provider IT applications

- TM Forum's role in actualizing the Open API program

- Influential program contributions from industry forerunners, including Amdocs

- Practical benefits and feedback from real-world implementations

- The future of TM Forum's Open APIs

# Understanding the Importance of API Standardization

The indispensable role of standards in the world of networking is not only widely accepted, it is an unquestionable necessity. Without firm standards such as SIP and the time-tested SS7, alongside governing bodies like 3GPP, ITU, IETF, and IEEE, communication between end-user devices across wireless and wired networks would essentially be non-existent. It is a universal truth that we commonly take for granted, one with which we assume, almost subconsciously, that phones and networks will just work as expected.

However, as we pivot our attention to service provider IT applications, particularly in Business Support Systems (BSS) and Operational Support Systems (OSS), the lines begin to blur. These systems have minimal dependency on network switches and other network equipment, and historically, there has been little impetus for standardization of software.

Over the past three to four decades, service providers have developed and implemented siloed solutions to handle specific business verticals. Mergers and consolidations further contributed to a somewhat disjointed approach to system development. Vendors such as Amdocs, Ericsson, and many others have traditionally created proprietary best-of-suite software applications to extend functionality across areas including customer care, provisioning, and billing. In the absence of a standardized framework, integrations between these mission-critical systems have often proven to be both costly and risky. Even the more recent shift of CSPs to cloud native technologies and best-of-breed solutions has only amplified the need for greater transparency and alignment.

Alongside their many technological benefits, standardized APIs also unlock a wealth of commercial opportunities. These standards facilitate cross-network collaboration, allowing different systems to communicate seamlessly with each other, fostering an environment of interoperability. This translates into increased application flexibility and compatibility, which in turn promotes innovation and market competitiveness. It also simplifies and streamlines customer-side development and maintenance, paving the way for resource-efficient deployment, further accelerating adoption.

In a rapidly evolving digital landscape, the technical as well as commercial benefits of API standardization are pivotal in optimizing resource deployment, enhancing customer experiences, and ultimately, driving business growth. Its adoption is not merely a strategic advantage, but a necessity for any business seeking to remain competitive and responsive to the relentless pace of technological innovation.
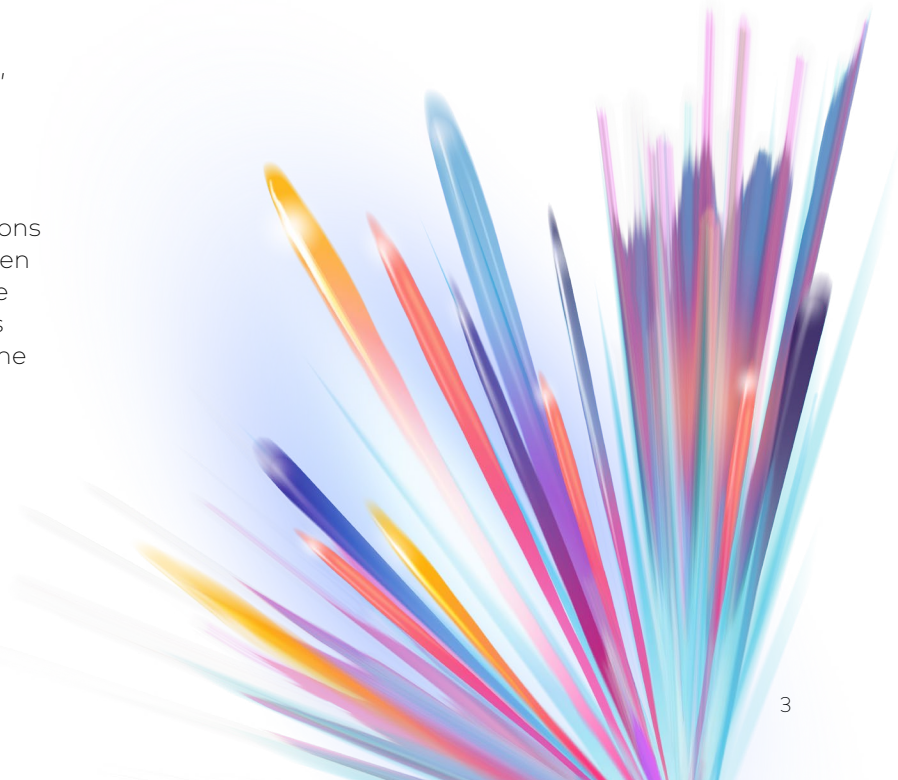
The Pivotal Role of TM Forum in API Standardization

TM Forum, the renowned industry body, has taken the lead in developing integration standards, launching various initiatives and programs over the years. A short list of precursors to the Open API initiative includes:

- **OSS/J:** Java-based APIs in the OSS Service area (provisioning, activation, fault management)

- **MTOSI – SOAP/XML:** Schema-based web services in the OSS Service and Resource areas

- **TMF Interface Program:** A wider program incorporating the previous initiatives but with a larger functional scope, using the Information Framework (SID) as payloads for API operations

These attempts, however, did not gain wide acceptance. While difficult to say with certainty, the lack of adoption was perhaps due to the software industry's shift towards simpler, text-based API constructs, such as REST. Either way, the need for a new, REST-based approach was clear, and TM Forum followed suit with the launch of the Open API program. Its first API designs were published in 2014 and are still accessible on the TMF website. To ensure its continued success, the Open API manifesto was launched in 2016, solidifying a commitment from CSPs and vendors to integrate Open APIs into their IT development landscapes.

Almost a decade later, TM Forum's progress is nothing short of commendable. From a handful of APIs in 2014, the program has grown to encompass over 60 APIs in 2023. These are backed by robust design guidelines, a consistent data model for API operation payloads, and a certification program that verifies API implementation.

The importance of the Open APIs can be summarized as follows:

- **Establishing a common language:** Industry terms such as 'Customer', 'Product', 'Service', and 'Account' now have standardized, unambiguous definitions. Similarly, entities have well-defined lifecycle states and transitions.

- **Setting standards for modeling:** The Open API guidelines (TMF630) prescribe best practices and patterns for modeling entities and business operations; for example, preferred names for common properties, how to relate entities to one another, task operations, and much more.

- **Enabling extensibility:** TMF recognizes that implementers of APIs may need to extend the standard to meet specific business needs. The guidelines ensure that extensions are made in a structured way, using the same patterns and concepts as the core standards model.

- **Offering broad coverage:** The APIs cover a large part of the service providers' functional landscape, as defined by TM Forum frameworks like SID and eTOM.

- **Simplifying integration:** With industry-accepted REST semantics and the widely used Swagger format, managing entities and expressing business capabilities has become significantly easier. For example, a consumer can invoke a REST operation from the Open API set to create a new customer or validate an address, with reasonable expectation that the provider of the API will expose the operation in the same terms.

- **Supporting event-driven paradigms:** The API framework includes a set of event definitions that support event-driven paradigms, common with microservice development and deployment architecture. The event language is identical to that of the entity and API.

- **Facilitating Open Digital Architecture (ODA):** As a key pillar in TMF's ODA, Open APIs allow ODA components to seamlessly communicate with each other. Conformance is evaluated, at least initially, based on their support as providers or consumers of the underlying Open APIs.

How Industry Leaders are Shaping API Standardization

Leading service providers, vendors, and system integrators have contributed significantly to the design and advancement of the Open API program. Amdocs, an active participant since early 2017 and recipient of multiple awards of excellence, is proud to have been acknowledged for its many contributions. However, this endeavor involves many hands under the stewardship of TMF's Pierre Gauthier, the Open API Chief Architect. Notable contributors include:

- **Global service providers:** Orange, Vodafone, Telefonica, AT&T, Deutsche Telekom, Telstra, NTT, and more

- **Vendors:** Amdocs, Ericsson, and the like

- **System integrators:** Bearing Point's Beyond Now, TCS, HCL, Marand, and others

Remarkably, and despite potential conflicts of interest (e.g., vendors of competing systems, CSPs operating in the same geographical area, etc.), these organizations have demonstrated exceptional cooperation for the greater good of the industry. Whether in regular virtual meetings or in-person 'spec jams', barriers are broken down in favor of collective progress. Although priorities and methodologies may differ across various program participants, let's explore how Amdocs, specifically, leverages the Open APIs and contributes to the project.

- Amdocs incorporates Open APIs as the foundation of API and functional design in new product lines such as Customer Experience Suite 2x and Digital Brands Suite, ensuring close alignment with TMF's published assets.

- Open API definitions are utilized wherever possible when incorporating external system functionalities.

- Amdocs' internal API design guidelines closely follow the published Open API design guidelines.

- API extensions are implemented to satisfy product and customer needs, with constant evaluation for potential contributions back to the core Open API program. Notable contributions include those made to 'Product Catalog' and 'Product Order'.

- Amdocs has designed complete APIs, such as Shopping Cart and Risk, based on its software and functional expertise.
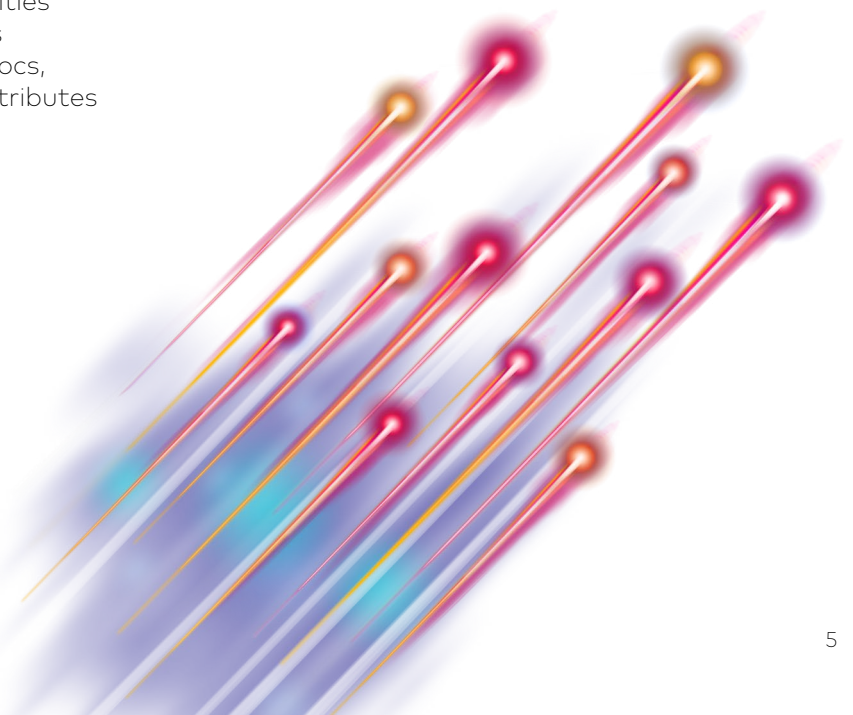
Feedback from the Field

Open APIs are witnessing increasing adoption within the service provider industry, as evidenced by:

• Open API metrics

• TMF community engagement

• CSP requirements

Open API Metrics

TMF publishes monthly metrics on the usage of Open APIs. This includes unique downloads of API assets (swagger files, user guides, etc.), completed certifications, training, and more. These metrics reflect a growing trend of organizations across the TMF membership spectrum actively utilizing these API assets. The following figure illustrates the steady increase in the rate of API asset downloads.
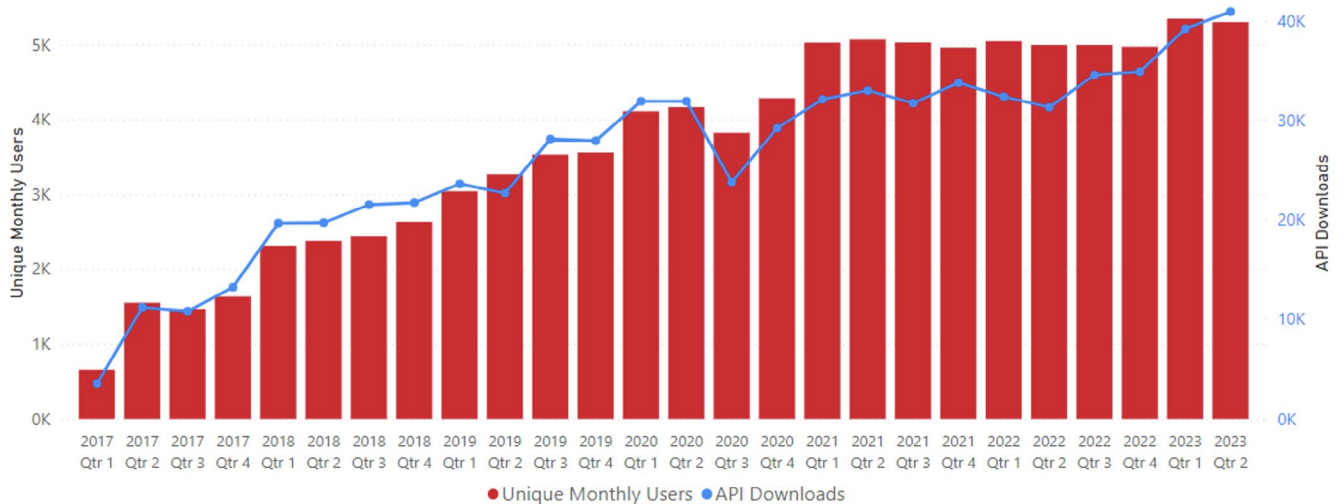
TMF Community Engagement

The TMF community messaging board serves as a hub for developers and designers to engage in discussions about TMF assets (similar in concept to the general software Q&A site – Stack Overflow). The Open API community stands out as the most active segment, with nearly 8000 discussions – three times as many as the next most active community. Discussions range from basic usage of TMF Open APIs to more complex debates on design patterns, API extensions, and more, with participation from a wide range of service providers, vendors, and system integrators. Amdocs has taken a lead role in answering questions, actively fostering this ecosystem of knowledge exchange and collaborative dialogue.

CSP Requirements

Owing to TMF's proactive campaigns promoting the Open API program, CSPs understand the benefits that alignment with these standards can bring. In fact, it has now become commonplace for CSPs to request alignment or compliance in their tender documents (RFPs/RFIs).

Throughout project implementations, Amdocs has directly witnessed CSP architects and integrators expecting its systems to align with the Open API documentation, with instances of CSPs even conducting static testing of the company's API swagger files against TMF specifications. Given the widespread adoption and acknowledgment of these standards, we believe that Amdocs' experiences mirror those of other program participants and contributors.

Exploring the Future of TM Forum's Open APIs

So, what's next for the Open API program? Several exciting developments are on the horizon. Here are a few key aspects:

- The forthcoming release of the first tranche of version 5 APIs makes some important enhancements, especially the upgrade to the now-standard format for API definitions (OAS 3, formerly Swagger). One immediate benefit of OAS 3 is the simplified implementation of polymorphic entities.

- Work is in progress to ensure API functionality in asynchronous mode, where applicable. This initiative builds upon the AsyncAPI standard, an extension of OAS/Swagger.

- Collaboration with other standards organizations (SDOs) continues. For example, one of the Catalysts for DTW23 will demonstrate how the CAMARA network API project can use schemas from TMF Open APIs.

- Domain-Context Specific models (DCS) are in development. The aim is to create definitive strongly-typed models for 'Product', 'Service', and 'Resource' tailored to specific lines of business. These models will align with and/or reuse existing standards and best practices, in cooperation with other SDOs, as pertinent. Examples might include:
  - 5G Slicing (a very early beta representation of 5G Slicing Service has already been published in the Open API beta table)
  - eSIM and its interaction with its hosting devices
  - Set top boxes, modems, and other broadband devices

- Conformance testing and certification for API consumers may potentially become available, an ancillary benefit of the Open Digital Architecture (ODA) certification effort. This would be a particularly useful addition for API users for several reasons:
  - Service providers would have greater confidence that their client-side implementation is compatible with certified API providers.
  - Vendors and System Integrators could demonstrate their ability to utilize standard APIs in areas not covered by their proprietary software. A case in point is Amdocs, which lacks native workforce management capabilities. Consequently, Amdocs' software requires integration with an external workforce management system to handle delivery order appointments. With the proposed certification, Amdocs, or any other vendor for that matter, could verify its successful interaction with the Address Management API.

- API enhancements and suites driven by TMF initiatives, such as Zero-Touch Partnership, Communications as a Service, Closed Loop Automation, and more are underway.

Despite the impressive progress of the program, it is important to note that version 5 of the TMF Open APIs will not be backward compatible with the current version 4. API implementers will likely need to support both v4 and v5 signatures, including Swagger 2 and OAS 3 specifications. Considering Amdocs' own experience in the transition from v3 to v4, a major API version upgrade entails significant development resources and extended support for both new and deprecated versions. Moving forward, TM Forum will need to balance the introduction of future API changes to maintain backward compatibility where feasible, while still fostering innovation and facilitating new business models.

Closing Thoughts

In this white paper, we explored the integral role of API standardization in the landscape of digital transformation, and how TM Forum's Open API program actively shapes this standardization process. Leading industry contributors like Amdocs not only provide valuable insight but also exemplify the practical benefits of adopting these standards. With real-world feedback reinforcing the positive impact of such integration, we affirm the significance and need for standardized APIs.

As we look ahead, it is evident that Open APIs are becoming central to service provider IT applications, reshaping their implementation while leading to a broader transformation within the industry.

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Listed on the NASDAQ Global Select Market, Amdocs had revenue of $4.58 billion in fiscal 2022.

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